$$RS = SQRT(\{S1^4/C1 + S2^4/C2 + . . + Sn^4/Cn\} / \{C1 + C2 + . + Cn\}) \qquad (I\text{-}1)$$

where:

Si = length of span i (horizontal projection)
Ci = chord length of span i

For a single span between dead ends, the ruling span is S * S / C, i.e. it is shorter than S.

It can be shown that the tension in a tension section under any combination of weather and cable conditions can be estimated by replacing the entire tension section by its ruling span. The ruling span of Eq. I-1 is used in **PLS-CADD** to make all tension calculations. The ruling span method is actually an approximation which has its limits of validity (Motlis, 1998).

Eq. 1-1 is an improvement over the classical equation for ruling span where Ci is taken equal to Si. The improvement accounts for the effect of spans with unequal end elevations. In **PLS-CADD**, the ruling span is computed with Eq. I-1. For more than one span and large differentials in end elevations, say in excess of 30 percent of the horizontal span length, the ruling span concept may not be accurate (Avril, 1974; SAGSEC, 1997). One might use finite element modeling of the suspended spans to determine sags and tensions (SAGSEC, 1997; SAPS, 1997).

PLS-CADD continuously keeps track of tension sections and replaces them by their ruling spans when a tension calculation is needed. Ruling span and tension calculations are done so rapidly that the program user does not realize that complex computations are being performed.

For example, if there is a suspension insulator at point D in Fig. I-1, the horizontal component of tension of the entire cable between points A and F is calculated by dealing with a single ruling span of length:

$$RS = SQRT(\{S1^4/C1+S2^4/C2+S3^4/C3+S4^4/C4+S5^4C5\} / \{C1+C2+C3+C4+C5\})$$

If there is a dead-end support at point D, the tension calculation for the cable between points A and D is performed with a ruling span of:

$$RSL = SQRT(\{S1^4/C1+S2^4/C2+S3^4/C3\} / \{C1+C2+C3\})$$

and that for the cable between points D and F is performed with a ruling span of:

$$RSR = SQRT(\{S4^4/C4+S5^4/C5\} / \{C4+C5\})$$